REPORT DOCUMENTATION PAGE

1. REPORT DATE (DD-MM-YYYY)	2. REPORT TYPE	3. DATES COVERED (From - To)
04/04/2018	presentation	04/04-05/2018

4. TITLE AND SUBTITLE
Evaluation of a Tool to Predict 90-Day Readmission or Death Following Hospitalization for COPD

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
Patlovany, Alexander S., Capt

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
59th Clinical Research Division
1100 Willford Hall Loop, Bldg 4430
JBSA-Lackland, TX 78236-9908
210-292-7141

8. PERFORMING ORGANIZATION REPORT NUMBER
17761

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
59th Clinical Research Division
1100 Willford Hall Loop, Bldg 4430
JBSA-Lackland, TX 78236-9908
210-292-7141

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release. Distribution is unlimited.

13. SUPPLEMENTARY NOTES
Texas Society of Health-System Pharmacists Alcalde, The Woodlands, TX, 4-5 Apr 2018

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Clarice Longoria
					19b. TELEPHONE NUMBER (Include area code) 210-292-7141

ARMY MEDICINE
One Team...One Purpose!
Conserving the Fighting Strength Since 1775

Evaluation of a Tool to Predict 90-Day Readmission or Death Following Hospitalization for COPD

Alexander Patlovany, Capt, USAF, PharmD

San Antonio Combined Military Postgraduate Year One
Pharmacy Residency Program
Fort Sam Houston, TX

BROOKE ARMY MEDICAL CENTER
A TEAM OF TEAMS...CREATING TOMORROW'S TODAY

ARMY MEDICINE
One Team... One Purpose!
Conserving the Fighting Strength Since 1775

UNCLASSIFIED//FOUO

Disclaimer

This research has been approved by the Brooke Army Medical Center Institutional Review Board.

I have no financial interest/arrangement, affiliation or relationship with one or more organizations that could be perceived as a real or apparent conflict of interest in the context of the subject of this program

BAMC: San Antonio Military Medical Center (SAMMC) plus 5 free standing primary care clinics
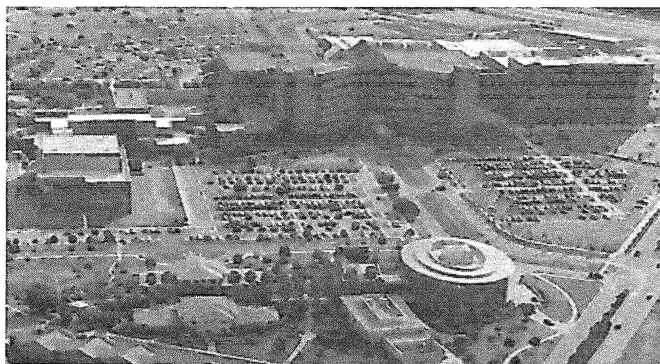
- Only DoD Level 1 Trauma Center
- 425-bed medical facility
- Army Institute of Surgical Research
  - DoD Burn Center
  - Battlefield Trauma Centers of Excellence
- 89 Accredited educational programs
- 35 Primary and specialty care services
- 32 Sub-specialty clinics
- 4500 outpatient prescriptions daily
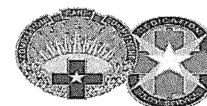
At the completion of this presentation, the participant will be able to:

- Identify components of the PEARL score

- Assess patients for risk of readmission for COPD

ARMY MEDICINE
One Team...One Purpose!
Conserving the Fighting Strength Since 1775

UNCLASSIFIED//FOUO
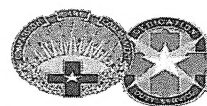
Background

COPD exacerbation admissions

- High degree of morbidity and mortality

  - 1/3 of patients readmitted within 90 days

  - Extensive cost on the medical system

- Clinicians don't accurately identify risk of readmission

  - Most tools focus on death or health status

  - Prognostic tool for readmission is needed

ARMY MEDICINE
One Team...One Purpose!
Conserving the Fighting Strength Since 1775

UNCLASSIFIED//FOUO
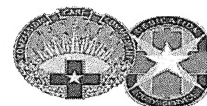
PEARL Score

- **P**revious admissions (2+)

- **E**xtended Medical Research Council Dyspnoea Scale (eMRCD)

- **A**ge (80+)

- **R**ight-sided heart failure

- **L**eft-sided heart failure
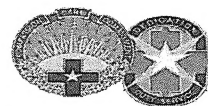
eMRCD vs. mMRC

| eMRCD	mMRC
1 – Breathless with strenuous exercise	0 – Breathless with strenuous exercise
2 – Breathless when hurrying on level or walking up slight hill	1 – Breathless when hurrying on level or walking up slight hill
3 – Walks slower than peers or stops walking at own pace	2 – Walks slower than peers or stops walking at own pace
4 – Stops after 100m or for after a few minutes on level	3 – Stops after 100m or for after a few minutes on level
Too breathless to leave house and: 5a – independent in washing/dressing 5b – dependent in washing/dressing	4 – too breathless to leave house or breathless when dressing/undressing
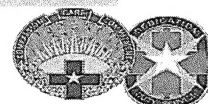
PEARL Score

PEARL Indices	Weight
2+ previous admissions	3
eMRCD 4	1
eMRCD 5a	2
eMRCD 5b	3
Age 80+	1
Right ventricular failure	1
Left ventricular failure	1

ARMY MEDICINE
One Team...One Purpose!
Conserving the Fighting Strength Since 1775

UNCLASSIFIED//FOUO
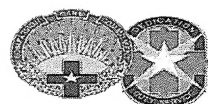
PEARL Score

Risk	PEARL Score	% Risk Readmission
Low	0-1	20.7
Intermediate	2-3	42.1
High	5-9	66.4

ARMY MEDICINE
One Team...One Purpose!
Conserving the Fighting Strength Since 1775

UNCLASSIFIED//FOUO

Purpose and Objectives

Purpose:
- Evaluate PEARL using the mMRC score in place of eMRCD

Objectives:

Primary: The ability of modified PEARL to predict risk of readmissions and death at 90 days

Secondary: The ability of modified PEARL to predict risk of readmissions and death at 30 days

ARMY MEDICINE
One Team... One Purpose!
Conserving the Fighting Strength Since 1775
UNCLASSIFIED//FOUO

Research Design and Methods

- Retrospective study

    - Assess modified PEARL score for COPD exacerbation admissions to SAMMC

- Inclusion Criteria

    - Patients admitted to SAMMC with a diagnosis of acute COPD exacerbation

    - Patients over 18 years old

    - Patients evaluated between 1 Jan 2016 and 30 Sep 2017
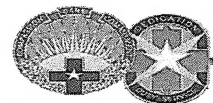
ARMY MEDICINE
One Team... One Purpose!
Conserving the Fighting Strength Since 1775
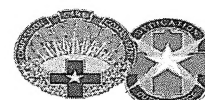UNCLASSIFIED//FOUO

Study Design

- Exclusion Criteria

    - Patients under the age of 18

    - Patients already included in the study

ARMY MEDICINE
One Team...One Purpose!
Conserving the Fighting Strength Since 1775

UNCLASSIFIED//FOUO

Methods

- Chart review via electronic health record

- Data collected from health records included:

    - Age at admission, sex, military status

    - mMRC and GOLD as assessed at last outpatient visit

    - Long-term, oxygen, steroids, and institutional care status

    - Smoking history (pack-years)

    - ABG pH < 7.35

    - Length of stay

    - Number of admissions in the last year

ARMY MEDICINE
One Team...One Purpose!
Conserving the Fighting Strength Since 1775

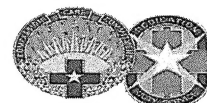UNCLASSIFIED//FOUO

Methods

- Additional Data collected from health records included:

    - Cor pulmonale diagnosis

    - Left ventricular failure diagnosis

    - Previous stroke/TIA diagnosis

    - Diabetes, atrial fibrillation, CKD, asthma diagnoses

    - Cognitive impairment diagnosis

    - If readmitted within 30 or 90 days

    - If death within 30 or 90 days

- Data complied in Microsoft Access©

- Statistical tests performed with Stata® version 14

ARMY MEDICINE
One Team... One Purpose!
Conserving the Fighting Strength Since 1775
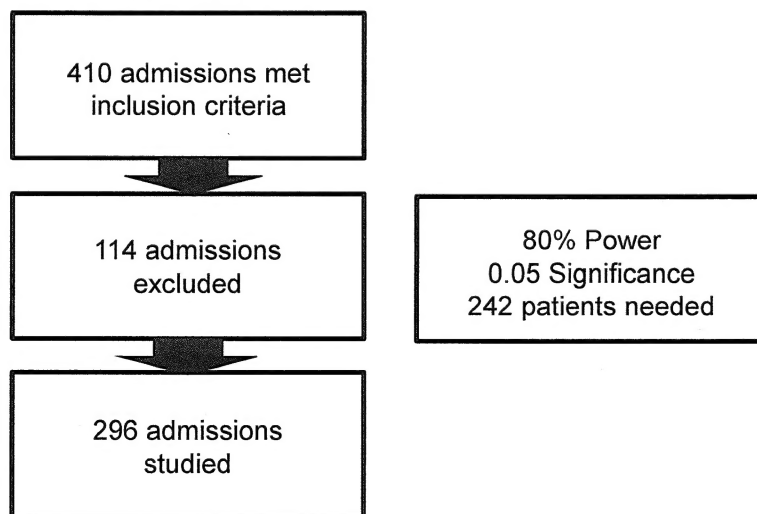
UNCLASSIFIED//FOUO

Methods

- Statistical assessment will be run twice
  - First with mMRC 4 assessed as eMRCD 5a
  - Second with mMRC 4 assessed as eMRCD 5b

- Imputation will be used for missing data

- Chi-square to compare PEARL risk assessment
  - Level of significance 0.05
  - Two-sided comparison

ARMY MEDICINE
One Team... One Purpose!
Conserving the Fighting Strength Since 1775

UNCLASSIFIED//FOUO

Methods

Admissions

410 admissions met
inclusion criteria

⬇

114 admissions
excluded

80% Power
0.05 Significance
242 patients needed

⬇

296 admissions
studied

Descriptive Statistics

	Patients
Males	172 (58.3%)
Median age (yrs)	74
Cor pulmonale	7 (2.4%)
Left ventricular Failure	74 (25.0%)
Long Term Care	13 (4.4%)
Diabetes	100 (33.8%)
Chronic Kidney Disease	42 (14.2%)
Stroke or TIA	18 (6.1%)

Descriptive Statistics

	Patients
Atrial Fibrillation	66 (22.3%)
Atrial Fibrillation	66 (22.3%)
Asthma	34 (11.5%)
Cognitive Impairment	20 (6.8%)
Length of Stay (Days)	2.7 (10.2)
ABG pH < 7.35	19 (6.4%)
Long Term Oxygen	112 (37.8%)
Long Term Steroids	13 (37.8%)
Cigarette Pack-Years	46.8 (29.6)

ARMY MEDICINE
One Team...One Purpose!
Conserving the Fighting Strength Since 1775

Descriptive Statistics

Gold Score	FEV$_1$	Patients
Gold 1 - Mild	≥ 80% Predicted	19 (7.5%)
Gold 2 - Moderate	≥ 50% to < 80% Predicted	92 (36.5%)
Gold 3 - Severe	≥ 30% to < 50% Predicted	100 (39.7%)
Gold 4 – Very Severe	< 30% Predicted	41 (16.3%)

ARMY MEDICINE
One Team...One Purpose!
Conserving the Fighting Strength Since 1775

Descriptive Statistics
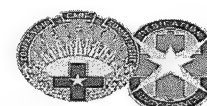
mMRC	Patients
0	35 (13.1%)
1	28 (10.5%)
2	42 (15.7%)
3	75 (28.1%)
4	87 (32.6%)

ARMY MEDICINE
One Team...One Purpose!
Conserving the Fighting Strength Since 1775

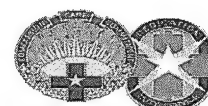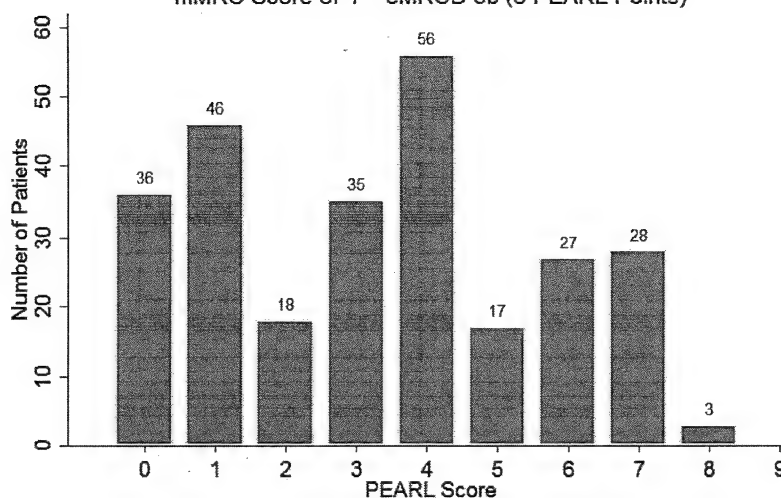| Event	Patients
Readmitted within 30 days	60 (20.3%)
Readmitted within 90 days	113 (38.2%)
Death within 30 days	1 (0.3%)
Death within 90 days	5 (1.7%)

ARMY MEDICINE
One Team...One Purpose!
Conserving the Fighting Strength Since 1775

Distribution of Patients by PEARL Score
mMRC Score of 4 = eMRCD 5a (2 PEARL Points)

ARMY MEDICINE
One Team...One Purpose!
Conserving the Fighting Strength Since 1775
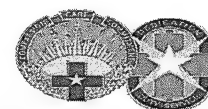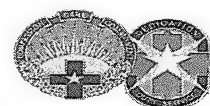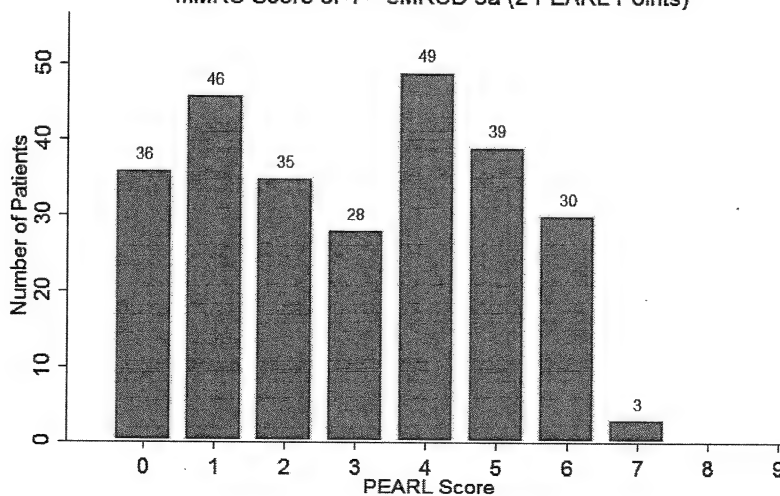
Outcomes

Distribution of Patients by PEARL Score
mMRC Score of 4 = eMRCD 5b (3 PEARL Points)

ARMY MEDICINE
One Team...One Purpose!
Conserving the Fighting Strength Since 1775

Outcomes

PEARL Risk	mMRC 4 = 2 Points	mMRC 4 = 3 Points
High	72 (27.1%)	75 (28.2%)
Intermediate	112 (42.1%)	109 (41.0%)
Low	82 (30.8%)	82 (30.8%)

ARMY MEDICINE
One Team...One Purpose!
Conserving the Fighting Strength Since 1775
UNCLASSIFIED//FOUO

Outcomes
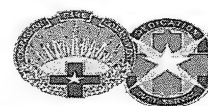
PEARL Category	mMRC 4 = 2 Points	mMRC 4 = 3 Points
Readmission at 30 Days	Significant (p < 0.001)	Significant (p < 0.001)
Readmission at 90 Days	Significant (p < 0.001)	Significant (p < 0.001)
Death at 30 Days	Not Significant (p = 1)	Not Significant (p = 1)
Death at 90 Days	Not Significant (p = 0.181)	Not Significant (p = 0.187)

ARMY MEDICINE
One Team...One Purpose!
Conserving the Fighting Strength Since 1775
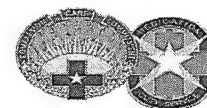UNCLASSIFIED//FOUO

Discussion
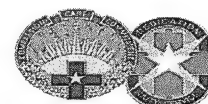
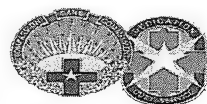Does the modified PEARL predict readmission and death in the DoD population?

- PEARL predicted readmission at 90 days but not at 30 days.

- Insufficient deaths were seen in the study population for PEARL to accurately predict them

ARMY MEDICINE
One Team...One Purpose!
Conserving the Fighting Strength Since 1775
UNCLASSIFIED//FOUO

Conclusion

- mMRC is an acceptable substitute for eMRCD

- PEARL may not be predictive of death in all populations

ARMY MEDICINE
One Team...One Purpose!
Conserving the Fighting Strength Since 1775
UNCLASSIFIED//FOUO

Limitations

- Limitations:

  - mMRC was not explicitly stated in most outpatient notes

  - Only admissions to SAMMC assessed

  - Death is not well documented

  - Incomplete outpatient records

- Future Directions:

  - This study demonstrates that modified PEARL is a valid tool for predicting readmission at 90 days but not at 30 days or death

  - Proposed prospective cohort study

    - Target patients at high risk for readmission

    - Incorporate intensive counseling at discharge

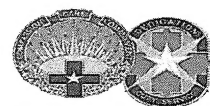   - Track 90-day readmission rate vs. a control groups

1. Which of the following is not a component of the PEARL Score?

A) Previous admissions

B) Age

C) Right Ventricular Failure

D) Length of Stay

2. According to the PEARL Score, which eMRCD score puts a patient most at risk for readmission after an acute COPD exacerbation?

A) 1

B) 2

C) 5a

D) 5b

- This project would not be possible without the guidance, support, and assistance of the following people:

Dr. Annabel Schumaker, PharmD, BCPS

Dr. Tom Shank, PharmD

MAJ Todd Schwarz, PharmD, BCPS

Maj Robert Kennedy, PharmD, BCPS

Everyone else who has supported me through my residency

For additional information contact me at:

alexander.s.patlovany.mil@mail.mil

1. Doll H, Miravitlles M. Health-related QOL in acute exacerbations of chronic bronchitis and chronic obstructive pulmonary disease: a review of the literature. *Pharmacoeconomics*. 2005;23:345-63.

2. Steer J, Norman EM, Afolabi OA, et al. Dyspnoea severity and pneumonia as predictors of in-hospital mortality and early readmission in acute exacerbations of COPD. *Thorax*. 2012;67:117-121.

3. Echevarria, C, Steer J, Heslop-Marshall K, et al. The PEARL score predicts 90-day readmission or death after hospitalization for acute exacerbation of COPD. *Thorax*. 2017;72:686-693.

4. Casanova C, Marin JM, Martinez-Gonzalez CM, et al. Differential effect of modified medical research council dyspnea, COPD assessment test, and clinical COPD questionnaire for symptoms evaluation within the new GOLD staging and mortality in COPD. Chest. 2015;148(1):159-168.

5. Healthcare Commission. Clearing the air. A national study of chronic obstructive pulmonary disease. Commission for Healthcare Audit and Inspection, 2006.

6. Roberts CM, Lowe D, Bucknall CE, et al. Clinical audit indicators of outcome following admission to hospital with actue exacerbation of chronic obstructive pulmonary disease. Thorax. 2002;57:137-41.
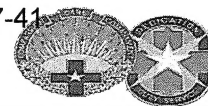
ARMY MEDICINE
One Team... One Purpose!
Conserving the Fighting Strength Since 1775

UNCLASSIFIED//FOUO

References

7. Allaudeen, N, Schnipper JL, Orav EJ, et al. Inability of providers to predict unplanned readmissions. *JAMA Intern Med*. 2016;176(4):484-493.

8. Puhan MA, Garcia-Aymerich J, Frey M, et al. Expansion of the prognostic assessment of patients with chronic obstructive pulmonary disease: the updated BODE index and the ADO index. *Lancet*. 2009;374:704-11.

9. Soler-Cantaluna JJ, Martinez-Garcia MA, Sanchez LS, et al. Severe exacerbations and BODE index: two independent risk factors for death in male COPD patients. *Respir Med* 2009;13:692-9.

10. Jones RC, Donaldson GC, Chavannes NH, et al. Derivation and validation of a composite index of severity in chronic obstructive pulmonary disease: the DOSE Index. *Am J Respir Crit Care Med*. 2009;180:1189-95.

11. Vestbo J, Hurd SS, Agusti AG, et al. Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease: GOLD executive summary. *Am J Respir Crit Care Med*. 2013;187:347-65.